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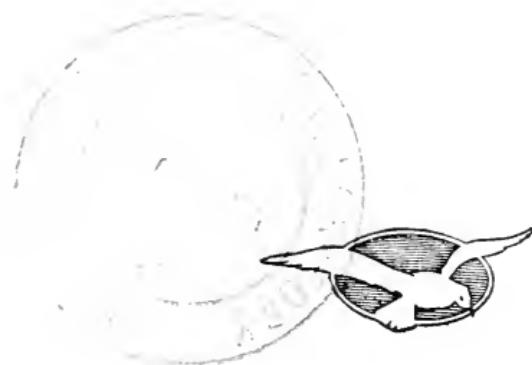
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FATALISM
OR
FREEDOM
A BIOLOGIST'S ANSWER

BY
C. JUDSON HERRICK
The University of Chicago



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PREFACE

THIS excursion by a biologist into a field usually posted "No Trespassing" from this side has a two-fold purpose: first, to inquire how far it is profitable to push the inquiry into the problems of human behaviour with the ordinary methods of natural science and so to knit our conscious and social life in with the rest of our world of experience in lawful fashion; and second, to see whether the conclusions thus reached shed any light upon the most acute problems of human conduct—self-control, self-determination, self-culture, social control, personal and social morality.

During the past ten years the writer has repeatedly endeavored to formulate these problems in strictly biological terms, so far as possible uninfluenced by philosophical tradition (of which, perhaps fortunately, he knows very little) and without sacrifice of the scientific method by yielding to the lure of mystical or metaphysical short-cuts which take us to the desired conclusions without troublesome distraction by inconvenient factual evidence.

PREFACE

This inquiry has been prosecuted in close collaboration with Dr. M. R. Gabbert, Professor of Philosophy in the University of Pittsburgh, to whom I here make grateful acknowledgment for guidance in that wide borderland where scientific and philosophical methods overlap. I am also indebted to Dean Frederick J. E. Woodbridge of Columbia University for helpful criticism. The argument upon which this work is based has been published in more condensed form in a paper entitled "Biological Determinism and Human Freedom," International Journal of Ethics, vol. 37, 1926. With the kind permission of the editors of the Journal, parts of this paper are here incorporated.

The present work is directed, not to the philosophical aspects of the subject, but to a more practical end. When human life—all of it—is evaluated biologically, where do we come out of the mazes of human origins and human destiny, of the determining factors of human conduct, of personal control and responsibility, of social betterment—or do we come out at all?

C. JUDSON HERRICK.
Chicago, Illinois.

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CHAPTER I

THE PROBLEM

THE ancients taught that the fabric of our lives is woven by the sisters of destiny and that our future is in their hands. This fatalistic doctrine survives to our day. Not being versed in the lore of classical mythology I will enumerate under their modern titles some of the fates of human destiny as now recognized.

1. The eldest sister is heredity, stern-faced, perdurable, conservator of good and evil, mostly good.
2. Next comes gestation, the kindly protecting nurse.
3. Birth, a fickle goddess, casting the lot now into a hovel, now a palace.
4. Nurture, presiding over the establishment of physical and social norms.
5. Education, Minerva, the school-mistress of intellectual norms.
6. Religion, the moral norms.
7. Art, the esthetic norms.
8. Vocation, craftsmanship, production, economic norms.
9. Politics, civic norms.
10. Sex, emotional norms, domestic norms.

There are many more residents of this

pantheon. These and others spin the threads of our destinies and weave the patterns of our personalities. Their control is real. Our problem is as to its nature and method of operation.

These fates are not independent and all-powerful deities. They are organized in hierarchies and all are subservient to a larger power which we call nature, with whose laws they must conform, for all of them are natural processes. The fundamental law of cause-and-effect no one of them can disregard or disrupt by a supernatural intervention. There are no epi-phenomena, or parallel phenomena, or other pseudophenomena in this pantheon of nature.

In the normal course of events these fates that rule our destinies are benevolent lesser deities who work together quite harmoniously, resulting in sane and ordered lives. So long as this is the case we need not meddle with them. They are modest folk and serve us well even though we do not even know their names. But if for any reason one or another of these, our benevolent elves, is out of tune with the others, is enfeebled by hereditary defect, by disease, by abuse, or by disuse,

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or is allowed to override the others and dominate them, the resulting imbalance may work disaster. And so it is that in order to diagnose such organic disharmonies we need to know these guardian spirits, or dæmons, and something of their ways of working.

The sisters are very unlike and they may combine among themselves to form little cliques or coteries or larger conspiracies which in the parlance of the day we call complexes. These complexes in ordinary normal life serve very useful purposes as organized and automatized units of experience and behavior, but sometimes they get out of hand and may mismanage and distort the whole subsequent course of life. These malevolent demoniacal possessions do not come in from the outside and capture the living body; they are fabricated within the personal experience and to exorcise them it is in many cases necessary only to turn on the light and expose their origins and mechanisms.

Clotho presides at the birth of every human child. Whence come the fibers which she spins into the thread of life? What determines whether that thread be promptly snipped or spun out to a ripe

old age? Lachesis casts the lot in accordance with which the thread of this one life is woven with other threads into the warp supplied by the world about. The course of my life is thus inextricably interwoven with the courses of other lives and all must adjust to the world in which our lots are cast. What part does Atropos, the inevitable, play in this adjustment?

The final pattern of this fabric is my life as it is lived in its environment. It is open to inspection, from the outside by my neighbors, from the inside by myself. The former appraisement is my reputation; the latter is my self-consciousness, self-esteem, and self-determination. How is this pattern woven? Is it wholly a natural process or only partly so? This is the riddle of human life. Can natural science lead the way to the oracle and interpret her cryptic utterances?

Heredity and environment are everywhere recognized as in control of human destiny, and in most of the recent discussions these are played up as the agencies through which alone the hope of further advance in personal and social welfare may be realized. Without belit-

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tling the part played by heredity and environment, is it possible that in these discussions another and equally important element in the problem has sometimes been overlooked—a younger sister of destiny and the fairest of them all, whose control over human conduct is not less real and indeed of greater import practically in personal education and social culture? May Freedom be admitted to our pantheon of Nature?

The conflict between the feeling of freedom and the belief that we are inexorably ruled by unescapable necessity is probably as old as human thinking. In the earliest times of which we have tradition man, so far as he thought about the matter at all, seems to have felt the helplessness of his position as the plaything of external forces. Accordingly he pictured himself as the victim of the caprice of the gods. Naturally he tried to placate the fetishes, demons, and fates who peopled his world and ruled his destinies.

Plato broke away from this naïve mythology, in part, and developed an explicit doctrine of freedom of choice. From his time till now the conflict of the schools has continued and to-day the fatalists are

still appealing to the same old gods of chance and necessity (under new names) as if they were omnipresent and omnipotent, while their adversaries, in the biological field, invoke still other, but unknown, gods under the euphonious but meaningless names of entelechy, *élan vital*, or some other symbol of uncaused action.

Determinism (fate) and freedom still perplex us. Human life is certainly controlled to some extent by the forces of nature in which we live and of which we are part. We certainly do exert some measure of control over the events of nature and over our own conduct. What is the nature of this control? We enjoy a feeling of freedom. Are we really free in any sense? Is the control which we actually exercise bound by natural laws as the earth controls the orbit of the moon in accordance with the laws of gravitation, inertia, and other cosmic forces? Are we actual causal agents, not merely bits of mechanism passively shunted about like the spindle of a loom?

In actual practice progressive, constructive men of all times have acted as if they were real creative agents, and the modern social fabric is knit together, strength-

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ened and motivated by the invisible, though strong, fibers of personal accountability for conduct woven into the web of our lives either explicitly and consciously or implicitly and perhaps unwittingly. The question before us is whether this appearance of freedom is an illusion, a myth, a superstition; or is it a real factor in human conduct, capable of being articulated with the general body of experience of nature (including human nature) and so of holding a place in our scientific thinking?

These big problems of human life—how are we controlled and how do we control our environments and ourselves—are solved, thoughtfully or heedlessly, by each of us in some fashion that is adequate for his daily needs, else human life and civilization could not endure. The earlier and simpler theoretic solutions have broken down under the stress of increasing complexity of living and more widespread critical analysis of the facts as they are experienced. The result is that those to whom we look for guidance in fundamental matters of personal and social adjustment are more sharply divided than ever into hostile camps and the rest of us are

left groping as blindly in the dark as were our paleolithic ancestors. They were like

An infant crying in the night:
An infant crying for the light:
And with no language but a cry.

With us the wail has become more vocal and better articulated. We know better what we want but there is no agreement, even on the basic question, to whom shall we address our invocations?

Some are quite content with the traditional faith which directs them to lay the burden upon an external and beneficent deity. Others in increasing numbers in our community hark back to a more primitive culture and place the responsibility for human conduct wholly on chance or on external, impersonal and mechanistic fate. This is, perhaps, the prevailing scientific attitude. Still others, more practically minded, go out aggressively for what they want without asking lief to do so from anybody. Experience seems to justify this third procedure, for these "go-getters" are the people who have the largest accumulations of material goods. Certainly those who adopt the first attitude

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must admit that God helps those most who also help themselves.

These are not merely academic questions to be debated in the schools with acute dialectic. They have assumed an intensely practical aspect. Especially during and since the Great War, when human life was cheap, when conventional codes of personal and social ethics were necessarily modified, when the courses of our lives were evidently so largely determined by forces quite beyond our control, have our traditional standards of personal responsibility for conduct been greatly altered. This widespread change has come about unwittingly, not by deliberate purpose. It has, however, been fostered by scientific and pseudoscientific propaganda and especially by appeals to biological laws. And now the procedure of our law courts, our medical practice, our administration of public and private philanthropy and our personal conduct are profoundly influenced by the growing belief that the human individual is only a bit of froth floating passively on the stream of circumstance.

Must we rest content with this, the oldest and the simplest of all philosophies

of nature, or else turn our backs on practical and scientific experience and appeal to mysticism or the supernatural? Are we drifting on the tides of time, driven by hereditary impulses and predispositions, buffeted hither and yon by cross eddies of the stream of current events and by the winds of chance? Or do we to any extent control the direction of our courses from within our own organizations, using the energies of stream and wind to steer to a haven of our own selection? And by what natural right can we claim the power so to determine our own careers? Is that wondrous tree of knowledge, whose fruits make us as gods knowing good and evil, wholly mythical?

CHAPTER II

BIOLOGICAL CONTROL

WE may define nature as the sum total of that which is experienced. This includes all that is presented to us through our senses and also the act of experiencing. This is our cosmos of which each of us is part. Natural processes are not disorderly. And the life that experiences these processes also runs an orderly course. Natural science is the aggregate of this experience as formulated in an orderly or lawful system. In natural science we search for facts and their meanings, that is, their relationships.

In a scientific inquiry we must first marshall the facts as we experience them. These experiences are then fitted together in a unitary system of natural events and the gaps in our knowledge filled in as best we may by faultless logical process. Natural science is not merely facts, nor facts classified according to some arbitrary system. It is facts in their natural relationships. And these relationships can be

discovered only by observation and reasoning. The reasoning must square with the observations. The scientific method admits of no appeal to mystical agencies which do not knit into a unitary system of natural processes and of no logical arguments whose premises are not verifiable experiences.

In the study of living things we recognize two kinds of vital processes. One is conservative, the preservation and repetition of bodily forms and behavior patterns time after time, typified by heredity. The other is progressive, constructive, typified by growth, learning, and evolution. Patterns of structure and behavior change. New patterns appear, some of which never before existed. These new things are not uncaused, but they are really new. Growth and evolution, as truly as heredity, go on in orderly or lawful ways. They are natural processes.

Ordinary growth is an act of creation. The body form is repeated (very nearly, never exactly) time after time, generation after generation. In each growing body new structures and new ways of behaving are made out of old stuff. The ma-

terial used is drawn from the outside. The power employed is a manifestation of the vital energies, which also in last analysis come from outside sources. This is the natural functional expression of protoplasmic organization and the growth implies that the organization changes from moment to moment as the process goes on. Learning is a creative process of the same sort. Every child builds up anew his own store of knowledge just as he does his body. Invention creates new arrangements of materials in machines, new combinations of form and color in sculpture and painting, new ideas in imaginative literature, which never before were experienced.

Evolution is the preëminent natural creative process. There is no evidence that when life began on our planet or when our cosmos began all subsequent history was actually present enwrapped in that primordial beginning. On the contrary, the evidence is that all growth and all evolution are genuinely creative events. At every step new patterns are fabricated by working over old materials; they are not merely unfolded ready-made.

In growth and in every other vital func-

tion the biologist recognizes a causal sequence. When he says that the present activity has been determined by preceding events, he means that the present structural organization of the body reacts to stimulating agents (arising either outside or inside the body) in ways which his experience shows are orderly. We find empirically that when the rules or laws of this order are correctly formulated we can use these rules to embrace events past or future which we have not observed and that further observations of similar events conform with them. A causally determined process as the naïve biologist employs this expression, is one whose progress conforms to empirically determined rules. By uncaused action he means events that do not fit into a unitary system of such orderly processes.

The naturalist characterizes the causal sequence as mechanistic or deterministic. Living mechanisms conform to the same general rules as dead machines, though the details of the construction and performance are very different. What is meant by determinism in biology is harder to explain, for there is apt to be a metaphysical implication concealed in it

somewhere. It certainly does not involve predeterminism in the sense of foreordination as theologians use this word, nor in the sense of preformation as biologists use this word.

In the orderly sequence of vital processes we say the present act is the result of the preceding members of the series. We say again that the present act is a causal agent (part of the causal complex) which determines the next succeeding act in the same sense in which it was determined. It is a determining agent in the sense that the succeeding history would be different if it were not there, and in this sense it is a necessary component of this particular causal sequence. A new causal factor enters at every turn. This process is orderly, lawful, and involves no disruption of natural causal sequences as biologists generally view them.

Having by this digression attempted to clarify what we mean by causally determined behavior, we see that our mechanistic determinism resolves itself into a progressive determining.

Certain causal agencies which bear an obvious relation to particular processes are spoken of as controls of those activi-

ties. Thus a dyke may control the flow of a river. In this sense some of the vital processes are said to control behavior. Hereditary organization, the physiological gradients described by Child, the activities of the ductless glands, and innumerable neuro-muscular mechanisms are illustrations of the apparatus of organic control.

In reviewing the various kinds of animals as these are known scientifically and in attempting to reconstruct the probable course of animal evolution we are impressed by the orderly progression in the complexity of animal bodies and in the efficiency of the correlated behavior patterns. This efficiency is measured by the range and variety of the animal's adjustments to the surrounding world in which he lives.

The worth and rank of living beings everywhere are measured by our capacity to assimilate the wealth of nature by which we are surrounded, to build it into the fabric of our own organizations, to use these materials and these energies productively, and to return them to the environment in which we live, stamped with the impress of our own individualities.

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This rule of life applies throughout the whole range of living things, from coral polyps to kings, the directors of industry and finance and the inspired authors of immortal creations in art and letters.

Thus we see that all living is a creative process. And its value to the organism and to the community in which one lives is measured by the efficiency of the internal controls. Those organisms, including those persons who are able to adjust themselves to their environments in more diversified ways, to assimilate into their own personal organizations more different kinds of things (material, dynamic, intellectual, esthetic, or whatever), to exhibit more diversified and appropriate behavior in every situation, and to modify their behavior more readily after untoward experiences—such organisms we call higher. They live more and they live better. They are more successful in what Stevenson happily calls “the continent art of living well.”

Every organism to some extent controls the environment in which he lives, and the pattern of this control of environment through behavior is shaped by the internal organization of the individual, which, in its

turn, has grown up during the exercise of these distinctively vital functions. Every animal below man also controls his own behavior to some extent from within his personal organization. He does what he does in part because of hereditary organization, in part because of present environmental influences, and in part because his internal organization at the moment has been shaped by previous experiences in the course of his individual life. This inner nature has grown up gradually through the exercise of his own innate powers in adjustment to situations as they arise.

Man is no exception to this rule. His inner nature is vastly more complex than that of any other animal and the influence of his personal experience plays an enormously greater rôle. Like insects and beavers and all other animal kind, we do have ourselves under some measure of control, we do control to some degree the world in which we live, and we make a bigger job of it. We cannot deflect the earth from its orbit, but we can divert Niagara from its channel and set it to work for us in a water mill. Beavers, too, can dam a stream, but they cannot do as

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many things with the impounded water as men can.

This control is real. It is no illusion to mock our anguished striving. Control of behavior and of environment is in fact a basic vital function. The organism differs from the dead mechanism through its control of the energies which play around it so that these do not corrode and destroy it, but on the other hand they nourish and perpetuate it.

This is brought about because the living body has the power to assimilate matter and energy and to shape these for its own ends, that is, to control the course of events taking place within its own substance in adaptive fashion. Control of environment and of behavior by internal processes, control of circumstances through self-control—this is our measure of the worth of life and the fullness thereof, from Amœba proteus to *Homo sapiens*.

This is not figurative language nor is there anything mystical or esoteric about it. It is a statement of commonly observed fact which endures the most searching scientific examination. The mechanisms of this internal control have not been fully explored, but there is a vast wealth of

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information on this subject which will be found summarized in the manuals of anatomy and physiology.

The environmental energies cause no reaction at all unless the bodily organization is in some way attuned to them. The blind man is entirely unaffected by the movement of a tarantula running down his coat sleeve; the average man dashes the vermin to the ground in terror; the naturalist may eagerly capture the rare specimen for his collection. The behavior in each case is determined by the internal organization at the moment, though this mechanism is set on a trigger which must be pulled by an external agency. The reaction in both of the last two cases is controlled, in one instance, by unreasoned impulse firmly implanted perhaps in instinctive endowment, in the other, by intelligently directed purpose; and we wonder whether the latter type of control can be subjected to scientific analysis as truly as the former.

When we know what energies reverberate within the single cell of an ameba while it goes about the humble business of its simple life a long step will have been taken toward an understanding of

that masterful dominance of the human brain which has made man the lord of creation. And to know these forces adequately is to be able to control them intelligently, to go beyond the simple tropism or reflex where response follows stimulus as immediately as the doorbell in my kitchen rings when the pushbutton is pressed, to replace the blind groping by trial-and-error and the destruction of those countless individuals who guess wrong by intelligently directed foresight and purposeful improvement of the living conditions, in short, to shape the future course of civilization.

These are not insoluble problems. In fact, good progress has already been made, and the spectacular results already achieved have put the investigation of these fundamental biological problems in so dramatic a setting as to make biological research the most exciting game on earth, and for the biggest stake—nothing less than the control of human destiny. And we play to win.

The biologist is by natural right an optimist. We have before us the actual historical records, in the form of fossil remains, of the history of animal evolu-

tion covering a period of perhaps a hundred million years, whose incontrovertible teaching is that animal life, as a whole, has slowly progressed, with many back eddies and temporary reversals of the flow, from lower to higher planes of living as measured by the standards which we have already adopted. Animal bodies have become progressively more complex, their behavior more varied, their adjustments to conditions of life more effective. Life is more diversified and richer, individual efficiency tends to replace mass action, and finally, self-consciousness adds to success the joy of striving and succeeding.

Through the biologist's lenses life is seen in its broader sweeps as well as in its microscopic details. Our vision is wide enough to see that all enduring life is successful life—some on a low plane, some at higher levels—and conflict, pain and the appalling mortality of all living things are only minor tragedies in the unceasing march toward better things, better as measured in terms of successful accomplishment; indeed, these are the wages which must be paid for constructive biological advance, just as in our personal experiences they form a necessary back-

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ground for repose, happiness and satisfaction in achievement.

From these reflections it is clear that control of behavior from within the organization is a fundamental vital property common to all organisms from the lowest to the highest. In the lower ranks of life this control can readily be seen to be mechanically determined in accordance with physiological laws, some of which are well established experimentally. Causal sequences can be followed through in these processes, from the incorporation by the organism of external materials and energies to the return to the environment of the material and equivalent amounts of energy as muscular movement, heat, etc. This physiological control is real and easily demonstrated by ordinary laboratory methods.

Of course, this is only a partial statement of the apparatus of biological control. All living is interaction between a protoplasmic organization and the energies of an appropriate environment. One may analyze and evaluate the vital processes from the standpoint of either the internal or external factors. We are concerned here only with the former. The

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latter are taken for granted as essential conditions for all living. The kind of life that is lived is dependent in part on the environment within which the body lives and moves and has its being, and in part upon the internal organization of the living substance at the moment. It is the internal organization or inner nature whose characteristics we now wish to examine.

CHAPTER III

HUMAN CONTROL

WHEN we come to apply these principles in detail to a consideration of human behavior we are confronted with grave difficulties. That a part of our conduct is mechanistically controlled in accordance with physiological laws, no one questions. But the mechanism and significance of this control are not always fully appreciated. There is general agreement that biological control has grown in range and effectiveness on the physiological plane from ameba to man. Now how about the other components of human life, the behavior colligated with conscious motives, purposes, choices, volitions? Are these genuine factors in human control? It is popularly believed that they are. Can this belief endure critical scientific scrutiny?

The assumption that the mental and the physical belong to different and incomensurable orders of being appears in two popular schools of philosophic thought

known as parallelism and interactionism, one of which allows no causal relation between the mind and its body, though these seem in some mysterious fashion to run parallel ways, while the other admits a measure of such causal relationship on occasion without defining the status of the separate entities or why and how they happen to enmesh with each other. As if the mysteries of mind and matter were not sufficiently baffling on their own account, these systems pile mystery on mystery, only in the end to add frankly insoluble puzzles to what was before obscure.

These are metaphysical, not scientific solutions of our problem and their acceptance seems to close the road to further progress by the method of natural science. The admission of these dualistic philosophies of nature brings our task to an abrupt conclusion; for the naturalist cannot deal with disembodied spirits.

It is quite the fashion now-a-days for biologists, physicians, and psychologists to adopt a different sort of short-cut solution of the troublesome problem of the relation between mind and body. Because nature is a unitary system of causal se-

quences and because we do not see how mind fits into such a system, therefore (it is argued) consciousness is an epiphenomenon or a sort of by-product which can be left out of the scientific reckoning altogether. This does not follow. There are no by-products in a total view of nature. And the fact that we do not know how these things are related does not prove that there is no natural relationship between them. This is a question of fact to be determined on evidence. If prejudged, it can only be on metaphysical grounds, and our "antimetaphysical" scientific leaders must watch their steps lest they become more hopelessly entangled in metaphysics than the metaphysicians themselves.

The methods of the "objective psychologists" are sound scientifically as far as they go and they have contributed much to our understanding of animal and human behavior. But they cannot claim to give a complete and scientifically adequate account of human experience. When consciousness (awareness of some sort) is present in a situation, this is a fact of experience which cannot be neglected in a total view of the experience.

It has already been noted that "verifiable experience" is the only legitimate basis for a scientific inquiry. Some objective psychologists claim that since introspective experience is a strictly personal matter it is not a verifiable experience and hence it is inaccessible to scientific investigation. This is an arbitrary and unjustifiable limitation of the scientific method. It is true that conscious experiences are unlike those objective events that can be verified by anybody who will repeat the conditions exactly. But one can experiment with his own conscious experience and modify the causal factors involved in successive repetitions of approximately the same experience. And with the aid of language we can get some insight into other peoples' conscious processes and compare them with our own. We must employ a very different technique when we investigate strictly subjective experience from that suitable for those experiences which we objectify, and proper scientific control of these observations is much more difficult.

Anger, for instance, is a conscious process. We can investigate the physical conditions which make us angry with the ordi-

nary technique of objective science. We can also compare one emotion of anger with another and study these subjective differences in relation to the antecedent external, physiological, and conscious causes and in relation to the subjective and objective effects of the pulse of passion. This is a difficult thing to do; but if we rule out of science everything but the easy tasks for which we already have suitable technical methods, science will not make much more progress.

Our subjective experiences are very real to us and before throwing them into the discard we may well inquire in an unprejudiced attitude whether they are not genuine factors in a rigidly scientific study of man, whose neglect leaves a fatal gap in certain very significant causal sequences. In fact the exclusion of the conscious processes from a total view of life as the biologist must study it is scientifically inadmissible and, as I have elsewhere remarked,¹ this procedure can be adopted only by an appeal (usually cleverly masked) to metaphysical, theological, mythological or other unscientific preju-

¹ *Brains of Rats and Men. A Survey of the Origin and Biological Significance of the Cerebral Cortex.* University of Chicago Press, 1926, p. 289.

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dices, or else as an expression of a subtle form of intellectual indolence which, confronted by a complex problem, seeks to simplify it by ignoring the troublesome factors. These problems will never be solved by confusing mind with not-mind, by taking refuge in the impenetrable murk of a supposed unconscious mind, or by defining mind as something else (say, biological adjustment, nervous functions in general, or "behavior") and then limiting the investigation to this other something.

This leads us back to our former question, What is the place of mind in nature and in human nature in particular?

Scientific men tend to take a radically mechanistic view of all natural phenomena. This is as it should be, for all of these phenomena seem to be interrelated as parts of a single natural system permeated with causal sequences. Any break in the chain of lawful or causal relationships, the recognition of any epiphenomena (call them mind, soul, spirit, or what you like) which are not integrally articulated with natural things and processes as these are known or knowable to science, the injection of any metaphysical dæmons, essences, categories, or entelechies into natu-

ral processes—these favorite expedients of the philosophically-minded when confronted with unresolved problems merely bar the way to further scientific advance. The coinage of a high-brow name for an unknown factor is not an adequate solution of a scientific problem, though this subtle device has at times retarded scientific advance for generations. If we desire to keep this discussion on the scientific plane (and this is our avowed purpose) the recognition of any uncaused phenomena in our scheme of natural things must be rigorously excluded.

The argument up to this point leads to a mechanistic view of matter and of mind. The only escape from this conclusion, which is repugnant to many people, is by an appeal to mysticism which is repugnant to the scientific mind or else by a practical negation of the reality and efficiency of mind in nature which is merely a lazy way of solving a difficult problem by ignoring all of its troublesome factors—besides flouting both scientific and common sense.

We have seen that biological control throughout the whole realm of living things is a lawful expression of vital energies, that these energies are all derived

in a last analysis from inorganic nature, that the forms of their expression in living bodies are shaped to a large extent by the organization of these bodies, and that the amplification of these mechanisms of control is perhaps the most significant factor in animal evolution. Control of human behavior is largely through mental power and this, as the man on the street correctly expresses it, is brain power. In the actual operation of all these systems of control, from ameba to man, they conform to the natural laws of biology, that is, they are all functions of specific structures related in causal sequence and hence mechanistically determined and mechanistically determining events. The more perfect the control, the more elaborate and efficient the mechanism.

There is abundant scientific evidence, which cannot be reviewed here, that thinking is a function of the body (and of the brain more particularly) just as truly as walking is a function of the body (and of the legs more particularly). Both of these functions have well-known, definitely assignable organs, and the scientific evidence for relating the function with the organ is of the same sort and is equally convincing in the two cases.

We know something of the physical and chemical processes involved in muscular contraction, in nervous conduction, and in thinking. It is true that our knowledge of none of these processes is complete, and we know less about the actual working of the bodily activities during thinking than of many other functions. But fortunately in this latter field we have direct awareness, not of the physical processes of nervous conduction, etc., but of the experience as such. There is mystery here but not necessarily mysticism. Ignorance is not an impassable barrier to scientific progress. The thing to do is to widen our experience, our factual knowledge, not to close the door to such advance by magical formulæ.

When we think, there is protoplasmic activity, chiefly in the brain, just as truly as when we walk there is protoplasmic activity, in this case chiefly in the legs. The internal activities and the organs employed are as different in the two cases as are the functions themselves.

Our awareness of what is going on (that is, of part of it) is only one of the manifestations of a very complex process which may include an external stimulus, various internal processes that can be demon-

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strated objectively, and the subjective experience. The latter is not a disembodied function. It is part of the vital process.

The function which I know introspectively as thinking would appear to another observer as protoplasmic activities of very complicated sorts, provided he had adequate technique to observe all that is going on in my body. Some of the radical behaviorists claim that the complete objective account of the process as made by such a hypothetical observer would include all there is of it. But this I do not admit, because another observer of my thinking process is incapable of having the experience which I have and his "complete objective account" does not and cannot express the whole of the situation. His account is still incomplete, for my experience includes an awareness component from which he is debarred by the nature of things. This awareness as a function of my protoplasm cannot at the same time be a function of his differently organized protoplasm. The experienced character of subjectivity is just this personal quality which cannot be shared with another. As we are constituted this is the way we ex-

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perience. I do not understand this. I accept it as a datum of experience.

Our common and trustworthy experience is that mental acts (thoughts, emotions, volitions, and the like) are causative factors in human conduct. This can be articulated with the rest of the natural history of living only by recognizing that these acts are protoplasmic functions. Even in those cases where we do not know the whole of the process, where we are ignorant of the organs involved, we must assume that the mental process, the experience which we actually have, has its structural and physiological correlates. The process, as a whole, including both the known and the unknown components, is causally related with the rest of my vital processes. When therefore, we say that conscious experience is a causative factor in human behavior it must be understood that we regard this experience as one part only of a protoplasmic activity involving structural changes in the nervous system, whether we know what these latter are or not. Thinking is a part of living and all living involves structural alterations of the vital substance.

There is a certain minimum mass of

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brain and complexity of its internal texture below which no higher mental processes are possible. A human brain with less than this minimum of organization, if taken from the body and preserved in a museum jar, will be immediately diagnosed as that of an imbecile by a neurologist who knows nothing of its previous history.

Our mentality is adequate for getting along in the world and for doing things which would be impossible without it. These activities which we know best introspectively comprise for us human folk the best and most important part of our vital processes. We must, therefore, take account of them in the natural history of human life. And by so doing we tremendously enlarge the scope of our analysis of human nature without sacrifice of sound scientific method. This "functional view" does not mean that thought is a "secretion of the brain" any more than it means that walking is a secretion of the muscles. Nor is it more objectionably materialistic than is the statement of the relation of any other function with its anatomical organ. What may be the relation between any organ and its function, any material and its properties, matter and energy in gen-

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eral—the answer to these philosophical questions must square with the facts as they are discovered, but into this speculative field we need not now enter. We are here interested only in the scientific and practical aspects of the question.¹

The word mind is used here in the ordinary traditional sense. It implies an awareness of some sort. Some of our experiences we objectify as external things; another complex of experience we objectify as our own animal bodies; still other experiences we do not objectify at all and call them ideas, hopes, sentiments, aspirations, ideals, and so forth. These are just as truly functions of our body as is our breathing. They are natural events. Their causes are preceding natural events, some outside our bodies, some inside, some easily demonstrable physiologically, some known only introspectively. Their results are still other natural events, some mental, some physiological, some perhaps profound changes in external nature.

A man may “make up his mind” to start a forest fire. Certain physiological processes ensue, resulting in striking a match. The result is the destruction of

¹ See *Brains of Rats and Men*, chapter xvi.

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a million dollars worth of property. If our knowledge of this sequence of events were complete we could unfold an unbroken chain of causally related members, beginning with certain hereditary traits, following through the development of a malevolent personality which cherishes a grudge against a brutal foreman, and culminating in the arrest and conviction of the felon. Some of the factors in this sequence we can describe as external events, some as bodily processes demonstrable as physiological functions. Others we can describe only in subjective terms because we do not yet know what cerebral, endocrine and other bodily processes have the peculiar properties which at present we can only describe as revenge, hate, purpose and the like. To ignore the mental components of this causal sequence because we do not know as much as we would like about the related bodily processes is a travesty of scientific method, for we can practically deal with revenge as a motive of conduct in common life, in the law court, and in a scientific analysis of the behavior.

We must therefore recognize conscious acts, that is, processes which we know best introspectively, as by far the most im-

portant agencies of control of human behavior.

Mental processes with their related bodily changes are unquestionably the most significant causal factors in human life, in both our personal and social relationships. Among these mental processes are the fabrication of language and other symbols, generalization from experience, and the formulation of laws of uniformity of natural processes. The exercise of these functions enables us to project these laws into the future and so to predict coming events.

With power of prevision and prediction comes ability to shape my present conduct with a view to its probable effect upon the future. In case the external situation permits two or more different reactions to an excitation, which of these will be taken is determined by the internal state of the organism at the moment. The discrimination may be made unconsciously, reflexly; and the essential mechanisms of this sort of discriminative reflex are fairly well understood. When, however, the discrimination is made consciously in view of the probable future consequences of each of the possible ways of reacting to the situa-

tion we call the act a choice. The choice is causally determined as truly as is the reflex; but there is nevertheless a world of difference between the two acts. A deliberate choice in view of possible future contingencies requires an enormously more complex nervous organization than does the reflex; this organization is chiefly in the cerebral cortex, and its grade of elaboration marks the chief difference between man and brute. The human cerebral cortex is more than twice as large as that of an ape of equal body weight.

The cerebral cortex is the chief organ of human control, is the most distinctive structural peculiarity of the genus *Homo* and unquestionably the most intricate, the most marvelous, and the most mysterious mechanism on our planet. Nevertheless, we can view this amazing organ biologically only as mechanism in action. Its regulatory control over conduct is undoubtedly knit into the total organization of our being in lawful patterns.

The most characteristic functions of the human cerebral cortex are thinking and the other acts of our conscious life. Biologically considered, these are functions of definite organs. There is no escape

from this conclusion without breaking over the confines of scientific evidence. And common experience makes it clear that these conscious acts are the most important controlling agents in human conduct. Of all our conscious acts, those which enable us to forecast the future and to shape our present conduct in view of possible future contingencies and of our desires for personal and social gratification are the most significant for the purpose of the following discussion. The ability to do this marvelous thing is part of our human nature, of the inner nature of man.

These human choices in view of the effect of a present act upon future events, as we have seen, are causally related. They are, however, commonly regarded as free choices. In what sense are they free? We must next inquire what we ordinarily mean by freedom. Is the concept necessarily mystical or is there a natural freedom?

CHAPTER IV

NATURAL FREEDOM

IN popular usage the word “free” is employed in two quite different senses which are often confused. These will here be termed natural freedom and mystical freedom.

By mystical freedom is meant the belief that in human conduct there are acts which are absolutely self-determined independently of natural causal sequences. There seems to be such an implication in the use by some people of the expression “a free choice” or “a free agent.” Such a belief, in so far as it implies uncaused action, cannot be admitted in a naturalistic argument. We, therefore, have no further concern with mystical freedom in this discussion.

In scientific usage, as in common life, the word “free” is generally used to describe a variety of natural processes which are carried through in orderly or lawful ways, as a freely flowing stream, “free air” at a garage, the free course of a rifle bullet, a freely twining vine, the free flight

of a bird, a free man who has just been released from jail. This is natural freedom, for all of the processes mentioned follow in orderly causal sequences.

Water flows freely if unconfined; that is, it is free to move in accordance with the laws of gravity, friction, inertia, etc. But water in the mill-pond behind the dam is not free in this sense. On the other hand the water of the mill-pond may be free to the traveler who wishes to dip and drink, while that of a free-flowing spring near by is privately owned and sold to thirsty travelers for a price. To the wayfarer it is not free. Water which is free to flow may not be free to drink. The meaning of the word "free" in the two illustrations appears to be very different, and so it is. Yet in each case there is a definite context within which no outside agent can trespass if freedom is to be preserved. Water free to flow must not be confined, though it may be sold; water free to drink may be bottled, but it must not be sold.

A locomotive is free to make sixty miles an hour on the track but not across country. We may, in fact, conceive a self-stoking and self-oiling locomotive which is

free to start from Chicago at 12 o'clock and run to New York over a clear track on a definite schedule. But it is not free to run to New York on the same track occupied by other traffic. Because the locomotive, when its run is over, is not free to go out and get drunk, why deny it the limited freedom that it has?

This natural freedom, as applied to inorganic and simpler vital activities, means that a thing or process with specific organization is able to exhibit the behavior characteristic of or typical for that organization in an appropriate environment. There must be no external or internal bar or impediment to the orderly progress of the particular behavior in question. Such freedom must be defined in each case with reference to the specific factor of the total situation whose typical manifestation is under consideration. It may be impaired or abolished by defective (atypical) internal organization or by inappropriate (atypical) environing conditions. If a thing is free from a monetary standpoint a charge cannot be made for it. A caged bird is not free to fly. A cripple is not free to run. A bankrupt is not free to endow a college.

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There is a popular impression that this freedom is opposed to control, but this is obviously fallacious, for the orderly process of cause-and-effect sequence is the indispensable condition for the manifestation of any free activities whatever. Otherwise we have chaos, not freedom. Disorder, or the disruption of normal patterns of performance, abolishes freedom. Freedom must appear within the lawful system, not opposed to it; but in a situation, where a particular type of freedom is designated, the activity characteristic of that situation must not be inhibited if freedom is preserved.

The perfection of this freedom depends upon the smoothness of the adjustment of internal processes to environmental agencies. Its value depends on the pattern of the organization and the setting or total situation within which it operates. An airplane may be said to have a wider range of freedom than an automobile, and the motor-car a wider range than the ox-cart. The larger and better the internal apparatus of control of behavior the more diversified is the behavior and the wider the scope of the natural freedom.

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The argument so far comes to this. The concept of freedom cannot be defined or even discussed scientifically outside the sphere of orderly or lawful causal sequences. Within this sphere, a process, or a thing, or a person may be said to be free in respect to some definite context. It is wholly a relative matter. A man who imagines that he is free to disregard all the laws of nature promptly terminates his career unless restrained in the asylum. And is any one of us in a position to choose to which of the laws he will conform? No, we must obey them all whether we like it or not. Within this lawfully determined and determining natural system we recognize in our common speech a natural freedom which, though limited, is real. The meaning of the word must, however, be carefully defined in each case where it is used with reference to the particular behavior under consideration.

Political freedom is obviously natural freedom as here defined. A nation is free though controlled by civil, criminal, and international laws, but only in so far as these laws do not obstruct the social and political evolution of the people. And the declaration of our fathers that all men are

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born free and equal means just this and nothing more. The constitution of our Republic guarantees to every man the opportunity to develop these natural powers without undue interference by the state. And the spirit of this constitution is violated by social injustice and by the neglect to provide the means of free individual and social advancement just as truly as by illegal seizure of goods or restraint of the person. Political freedom develops within a system of political laws just as natural freedom everywhere operates within the realm of natural laws.

This natural, or common-sense freedom is generally admitted. But what of its value? Is it a mere play upon words, a derisive mockery, to yoke together this pitiful fragment of freedom with the creative freedom of will so generally regarded as man's noblest attribute?

In considering natural freedom one is perhaps first impressed by the poverty and impotence of so meager a dole. Is so contracted and exiguous a freedom worthy of the toil and anguish which mankind has expended upon its quest? Can nothing better be said of so mean a mistress than to characterize our Audrey as

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"A poor virgin, sir, an ill-favored thing, sir,
but mine own"?

Before adjudicating this question we must inquire further into natural freedom as exhibited in human conduct. We shall endeavor to adhere strictly to the scientific method in our examination of human freedom, its characteristics, its limitations, and its practical significance in personal and social adjustment.

CHAPTER V

HUMAN FREEDOM

HUMAN conduct, including human thinking which is one of the mainsprings of our behavior, follows in causal sequence just as truly as does the behavior of a soap bubble or a reflex arc; but the causal sequence is very different in the three cases. Each of the mechanisms involved is free to work out and bring to expression its own inner nature except in so far as the dynamic pattern of its organization is distorted or obstructed.

The organization of any man at any moment, as we have seen, is the result of the interaction of the original nature (heredity) and the second nature (nurture). None of his adult characteristics were present as such in the original germ cell within which the causal sequence which we call a personality began; but this germ cell was endowed with the potentiality to develop into the particular person that I call me or you (that is, to unfold its original nature) only under the influence of

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the environmental agents that are normal and typical for the species. Any considerable departure from this typical environmental setting results in atypical or abnormal development, and further departure results in failure to develop at all—death. And even within the normal range of environmental variables the course of the unfolding of the original nature and the fabrication of the added patterns of the second nature within this original warp and weft are shaped from day to day by the previous day's experience.

This experience may affect the external form of the body, as in Chinese foot-binding, it may affect the chemical balance of physiological processes, as in deficiency of the pancreas, resulting in diabetes, it may affect the mental vigor, as in psychic trauma or nervous shock. The illustrations chosen are of subnormal development arising from defect or a limitation imposed upon free growth and freely running physiological processes. Conversely, free growth in all of these fields is promoted by exercise, by the normal use of the native capacities, mental as well as physiological.

The natural freedom of which we are now speaking is nothing other than the freedom of any organization to "run true to form," that is, to operate in accordance with its own inner nature in situations appropriate for that operation. It is the nature of a spruce tree to grow in a definite way and so to exhibit a characteristic form; it is the nature of a grapevine to grow in a different way; and each will assume its own peculiar adult form, if free to do so, that is, if its natural or "free" growth is not prevented by atypical internal or external conditions. This same rule of natural freedom applies in the human realm. The child or the man is free to unfold and develop his original nature (whatever that may be), unless this process is restrained by atypical or unfavorable external conditions. If the original nature is defective and the man is consequently feeble-minded, the range of his natural freedom is to that extent contracted, a fact that is recognized both in law and in morals by a corresponding relaxation of his responsibility or accountability for his acts.

The original nature of man includes his inherited bodily form, his reflexes and

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instincts, and certain potentialities for further development whose exact patterns will be determined by the environment in which he lives, that is, by the educative processes to which he is subjected. On the structural side, his inner nature at any stage of his life is his protoplasmic organization at that moment. His conduct is determined by the reaction of that inner nature to the environmental conditions then prevailing.

Some of our personally acquired processes, moreover, have the remarkable and mysterious property that we have an awareness of what is going on (or part of it) while they are acting. These are set over against all of the others as the components of our own conscious experience. And when this conscious experience becomes sufficiently elaborated so that from the totality of single experiences we are able to build up general ideas or abstractions and to express and fixate these by the use of language and other symbols, we have acquired the mental instruments and technique necessary to evaluate experience in terms, not only of its past significance (generalization) but also in

terms of its possible future significance (prediction).

The prevision of possible consequences of an act is a causative factor in determining present action. If the discharged employee to whom reference was made above, when he is inclined to light a forest fire, foresees inevitable capture and conviction for his crime, his hand will be stayed and the lighted match is extinguished. And the emotional thrill which goes with the evaluation of a contemplated act, the approval or disapproval with the welling up of wish or desire or aversion —these, too, are causal factors in shaping the act.

An intelligent choice is a freer choice in contrast with unconsciously determined processes in that one looks ahead to the consequences of action and this prevision is a real component of the causative complex. Because we can see consequences we choose between them. And this choice is free in the ordinary sense of the term (if we leave the mystical concept of "un-caused" out of the reckoning). It is not that I have foreknowledge of what I am compelled to do. But the foreknowledge of possible consequences is a true causative

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factor in determining what I actually shall do.

This ability to forecast the probable future result of a course of action not yet undertaken marks a critical stage in the evolution of human control. I foresee two possible ways to adjust to a present situation and I weigh their relative advantages. Deliberative choice now replaces unconscious physiological discrimination in the resolution of problems of behavior. Both ways are open. I am free to choose one or the other so far as external compulsion is concerned. I may take the right-hand path because it leads toward the comforts of home. A honey bee or an ant would do the same.

But in my own case I have a vivid mental picture of the reception that probably awaits me there. If I have been hunting for a destitute household and am returning at dusk empty-handed, a moment's reflection may check the homing instinct and I deliberately turn to the left, taking the longer way home in the hope that its better cover for game may favor a lucky shot and a supper for the children. Which-ever alternative I may choose it is clear

that every step is causally determined in the same sense that my reflexes are said to be causally determined. If I yield to fatigue and discouragement and take the direct path homeward it is perhaps because my lot has before been cast in pleasant places and a soft and carefree life of ease has left both muscles and determination flabby from disuse. But if previous training in adversity has kept both bodily and mental vigor fit and has developed a sturdy independence of will and a sense of responsibility for my dependents, a snappy choice to keep at the job regardless of fatigue or discomfort comes by second nature without delay or cavil.

With self-consciousness in a social environment comes enlargement of the self to include the *socius*. To self-preservation and self-realization are added the preservation of the family and the clan, and from these motives arise the social sanctions which when seen in clearer mental perspective become ideals and moral sanctions. Out of these social relations grow our codes of responsibility and accountability for behavior. These finer humanities and their cerebral organs grow with use as does our muscular skill or they

atrophy and revert to bestial levels if neglected.

The conclusion is that the ability to use language, numbers and other symbols in thinking and the rational prevision of future contingencies gives greater capacity for control of nature and of our adjustment to it and for control of the social progress of the community in which we live. These same powers lead to the development of personal ideals which become dominant motives of conduct and which may eventuate in a large measure of self-control, all in lawful patterns of cause and effect sequences. These thoughtful judgments and consciously fabricated ideals and their related emotions and sentiments are real causal factors in shaping all future conduct because they are biological components of the vital process; and in so far as they do influence behavior the range of natural freedom, that is, freedom to unfold the original nature of the organization in lawful patterns, has been by so much enlarged.

This freedom, I repeat, is real. The normal man in normal environment is free to work out his own inner nature and to enlarge and refine it. He is free to de-

sire a multitude of things, to work for these and to enjoy their attainment. Sloth, whether due to hookworm or any other cause, is an impassable barrier to this freedom. But all experience shows that a healthy and vigorous mind does have the power to whip sluggish and jaded muscles into fresh effort, and that the quickening of some interest or curiosity or hope or fear may be an adequate excitation to transform apathy into a frenzy of intense mental and physical effort. A stump speaker in a fervid political campaign may mount the platform of his tenth speech for the day in a daze of fatigue, but at the end of five minutes he may be firing his audience with his best oratorical performance and answering the hecklers with keenest repartee, only to collapse as soon as off the stage.

We cannot create these mental energies out of nothing, for they are functions of bodily organs,¹ but we do have the power by intelligent choices so to direct our conduct that we place ourselves in receptive attitudes toward the sources of mental strength just as we can decide whether

¹ On the mechanisms of these vital reserves see chapter xvii of my book, *Brains of Rats and Men*.

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to eat and nourish our bodies or to diet and reduce our weight. To follow the lines of least resistance in the mental field leads backward toward our biological origins, toward bestial reversals; to make full and intelligent use of our native endowments looks forward toward richer and freer life, to have life and to have it more abundantly. And we do make these choices.

This power to choose, that is, to shape our conduct in view of one out of several possible future contingencies, is no supernatural or miraculous endowment which enables us to flout the laws of nature; it operates within the natural realm and in harmony with natural law.

There is a widely current impression that the recognition of this "power of choice" or of making an intelligent selection of one out of several apparently possible ways of reacting to a situation implies uncaused or lawless action. "Mystical freedom," however, we have eliminated from this discussion, and no one who insists upon admitting it here can follow the subsequent argument. Our "intelligent selection" is not disorderly or lawless.

Take the case of an unintelligent selec-

tion. Here is a box of floor-sweepings, containing sawdust, a few iron nails, bits of leather, sand, pebbles and other odds and ends. A magnet is stirred around in the mixture and it draws out all the nails and nothing else. The magnet makes a selection but not a choice as we have defined it.

Again, a man observes the box of sweepings and wishes to recover the nails. He selects the magnet from a rack of miscellaneous tools and in a moment he has the nails in his hand. Are not his wish to have the nails and his choice of the magnet causally related with his previous experience and present bodily organization just as truly as the magnet's power to select iron is related with its previous history and present organization? They certainly are if our previous reasoning is valid.

What determines the selection of the iron by the magnet? We know the mechanism of this process pretty well and the physicist can explain the rules of magnetic action in detail. But even here he soon reaches a point in his explanation of magnetism where he must say, "I do not know."

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What determines the selection of the magnet by the mechanic who wishes to find a handful of lost nails? He reflects upon where he was working when he last saw them, upon what he was doing, upon the other events of the time and place. He looks upon the floor and notices that it has been swept. Where are the sweepings? He hunts up the janitor's dust bin. Are they in there? It will be a messy job to find out. A moment's further reflection suggests a sieve, but none is handy. As his eye roves over the shop it falls upon the magnet. Just the thing!

The cause of his choice of the magnet is, of course, the total situation, but the decisive factor was the "accident" of the incidence of an image of the magnet upon the man's retina at just that moment. If the magnet had not been in the rack, if the mechanic had overlooked it, or if he were ignorant of the properties of magnets, this choice would not have occurred. The choice was not made by some extraneous spiritual entity working upon or through the man's body. It was made by his body working in normal fashion in a particular external situation. The fact that the onlooker or the mechanic himself may have

no clear awareness of the "accidental" glimpse of the magnet in the rack or of innumerable other factors in the causal complex may lead to the belief that the choice was "spontaneous" or uncaused. But critical examination shows that it was nothing of the sort. The inference that it was a deterministic process throughout is no more invalidated by our ignorance of all of the details of the physiological mechanism employed in seeing and thinking than is our belief that the magnet itself is a natural mechanism invalidated by the fact that we do not know the ultimate nature of magnetism and electrons.

Does the man's intelligent selection therefore differ in no significant way from the magnet's unintelligent selection? It does not differ by the addition of any mystical or supernatural features or in being less truly a natural process; but it does differ by just this quality of intelligence which we have no evidence is there in the case of the magnet. This we can judge objectively by comparing the behavior of men and magnets. And if I am the man in question I have experience of the intelligence and of the wish and the voluntary impulse directly. I do not ex-

perience directly the correlated changes in the structural organization of my cerebral cortex—its metabolism, changes in electric potential, etc.—though I have indirect evidence of structural changes here just as truly as I have in the case of the magnet.

The difference between men and magnets is certainly significant and not the least of these differences resides in the fact that human behavior is the expression of an organization one of whose manifestations is intelligence. The intelligence, with the related bodily changes (whether we know the latter or not), is therefore a real component of the human choice, and an essential component. The behavior would be different if it were not there. Its admission as a causal factor implies no break in the causal sequence, but it does involve the recognition of a factor of a very different sort from that seen in inorganic and simpler physiological behavior.

The belief that any one of several courses of action may be chosen is also a real factor in the causal complex resulting in the behavior finally exhibited. In so far as this factor is operative, belief in

freedom is a real component of the behavior, even though it should later be evident that the grounds for the belief are partially or wholly fallacious. It is clear that judgments which have been reached, whether factually and logically valid or not, may be real causes of subsequent action. The judgment or opinion, let us not forget, is not a disembodied function; it results from changes in brain texture just as truly as movement of my arm results from changes in the texture of my muscles.

If I honestly do not believe that I am free to choose, it would appear that no amount of foreknowledge of possible future contingencies can lead to any possible modification of my behavior in view of this knowledge. I will passively await my fate with whatever of stoic calm I can command.

But this no normal man can do without long training in the subordination of his natural impulses to an unnatural philosophical dogma. And these impulses can never be fully subjugated. The biological inheritance of struggle for existence and mastery is too strong. The reflex discrimination and unconscious "physiological

choices" which from time immemorial have shaped his conduct cannot forthwith be abrogated by an intellectual dogma. When attacked he may spring to the defensive utilizing every ounce of his strength and every resource of his skill. And into this stream of biologically directed energy he will pour all of intelligent insight and foresight that he can command. This he will do, even though convinced by irrefragable logic that he has no freedom of choice whatever in the matter.

If, now, our hypothetical fatalist is a railroad magnate fighting for control of a competing line, he will follow similar rules, though in this case the struggle may be prolonged for decades. Every step in his campaign is carefully planned in advance in view of all possible future contingencies and of the effect of the proposed action upon each of these contingencies. His final decision after mature reflection is a free choice in the commonly accepted sense of the term, and this natural freedom is in no wise destroyed or impaired by the recognition of the fact that every step in his progress follows in causal sequence, provided only that we also rec-

ognize that the mental acts, including prevision of possible consequences of his various overt operations, are integral parts of the causal sequence. No matter what his philosophy teaches him, he must behave practically by making one decision or another, or the struggle automatically comes to an end. The belief that he is free is a powerful aid to his decision. And people who do not make decisions do not become railroad magnates. Indeed, in extreme cases such people may be committed to a mental hospital under the diagnosis of insanity of doubt (*folie du doute*). Here pathological deterioration of natural freedom of choice is an expression of an organic breakdown.

Centuries of dialectic have contributed little toward the solution of these problems. An ancient dogma affirms that consciousness, being a spiritual entity, can have no efficient causal connection with matter. But common experience replies that actually it does do just this impossible thing. We have no well-authenticated, recorded instance where faith alone has removed a mountain; but faith joined with engineering skill (which is also a conscious process) and supported by a sufficient

equipment of explosives, steam shovels, etc., can do so and has repeatedly done it. This result would not have followed in the absence of these causal factors.

Faith as a motivation of human conduct has been appealed to by mystics from time immemorial. But the mystics have no monopoly of faith. Modern scientific medicine is as little touched by mysticism as is any field of human endeavor; and here is what Osler said about faith:¹

"After all, faith is the greatest lever of life. Without it man can do nothing; with it, even with a fragment, as a grain of mustard-seed, all things are possible to him. . . . While we doctors often overlook or are ignorant of our own faith-cures we are just a wee bit too sensitive about those performed outside our ranks. We have never had, and cannot expect to have, a monopoly in this panacea, which is open to all free as the sun, and which may make of every one in certain cases, as was the Lacedemonian of Homer's day, 'a good physician out of Nature's grace.' Faith in the gods or in the saints cures one, faith in little pills another, hypnotic suggestion a third, faith in a plain common doctor a fourth. In all ages the prayer of faith has healed the sick, and the mental

¹ In 1901. Quoted in Cushing's *The Life of Sir William Osler*, vol. i, p. 546, Oxford, 1925.

attitude of the suppliant seems to be of more consequence than the powers to which the prayer is addressed. . . . The faith with which we work, the faith, indeed, which is available to-day in everyday life, has its limitations. . . . But in spite of these nineteenth-century restrictions, such as we find it, faith is a most precious commodity, without which we should be very badly off."

It is, therefore, possible to say that, in a certain limited sense, the belief in freedom is freedom. But it must be reiterated that this belief is a natural result; it is also a natural cause.

So far as the evidence available at present goes we must conclude that the lowest animals act in response to present excitations in ways that have been shaped by their previous personal and racial experience. They live in a present and a past. They know no future. Mankind lives in the future also. By an exercise of imagination possible future events are pictured as present and so participate in shaping present conduct. This implies no magical powers. It is a natural function of the human type of nervous system. It has doubtless grown up naturally in the course of human evolution.

The actual exercise of discriminative reactions, physiological choices, behavior adapted to benefit the organism or its offspring in future contingencies, social behavior of a sort (as in a hive of bees), these manifestations of biologically adaptive behavior have evidently antedated, historically, human choice, social responsibility and altruism. These latter functions have grown up within the former. People, too, have acted intelligently, presciently, and morally before the laws of these behavior patterns were codified, just as they spoke correctly before the grammatical rules of syntax were formulated. Moral freedom grew up within natural freedom of simpler sorts, but it has not thereby become mystical freedom. Our natural science embraces the sum of experience and our moral freedom is part of human experience.

We wish here to turn the spotlight on the characteristics of mankind that are different from those of brutes and to inquire into the nature of these differences. Mentality of the human type is a new evolutionary pattern and the enlargement of man's powers resulting from the development of these mental faculties is stupen-

dous. Its importance can hardly be exaggerated. This is the natural basis of the material advances in the history of human civilization. And it is far more than this.

I can predict with some degree of assurance the effect of a proposed course of action upon coming events and upon the behavior of my fellow men. And, what is far more important, I can predict its influence on my own character. By deliberate choice I can shape (to some degree) my own further mental and moral nature. This gives to us a technique of control, and of self-control in particular, which so far as we can judge is not available to any other species of animals. This theme I have elaborated elsewhere,¹ from which the following passage is quoted:

"I can 'make up my mind' to become a physician, and I can deliberately subject myself to the hardships of the rigorous training necessary to qualify for this profession. It is not within my power as I leave the high school with my diploma, to enter at once into a lucrative practice; but it is within my power to imagine myself doing so ten years hence, to determine that I will do so, and to take the first step necessary to create in myself the capacity to

¹ *Brains of Rats and Men*, p. 359.

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do so. All of these steps and all of the succeeding steps during the long apprenticeship are casually related, and not the least of these causes is the will to achieve, a will that can be strengthened by use and guided by wise instruction as truly and as efficiently as my muscles and ‘wind’ can be trained for a foot race.”

In so far as I thus intelligently shape my courses of action in view of ideals of personal character and social responsibility I am also a partner in the business of shaping my own inner nature. I am engaged in character building. My part in this process is real. And these acts are moral choices in the ordinary sense of this term, whether or no I recognize any further accountability to ethical or religious ideals. And let us not for a moment lose sight of the fact that all of these choices which thus share in the process of fabricating my own inner nature, in shaping my character, are natural functions of my bodily organs.

The “free agent” who makes such choices and sets before himself ideals of personal and social conduct is exercising his natural freedom not only to express his present inner nature but also to revamp this nature in conformity with some new

pattern. This is all that we mean by human freedom in common usage if the mystical concept of uncaused action is excluded, and it includes what we commonly call moral freedom in so far as this is definable in scientific terms. These choices are certainly free in the naturalistic sense in which we have used the word.

The natural freedom of man conforms to the definition with which we started; it means that the human being with a specific organization which has grown to be what it is by natural process is able to exhibit the behavior characteristic of or typical for that organization when living in an appropriate environment. What sets off human freedom from other kinds of natural freedom is the immeasurable difference between the inner nature of man and that of all other natural objects.

CHAPTER VI

NATURAL FREEDOM IS REAL FREEDOM

THE actual operation of natural freedom as exhibited in human conduct may be illustrated by an example.

The young child cannot swim. Unlike the dolphin, ability to swim is not part of his inherited capital. He grows up, let us say, on the river bank among other boys, some of whom swim and some do not. His own attitude toward the water is shaped largely by environmental and social influences. The drowning of a playmate may fill his mind with dread of the water. But the ridicule of the other boys urges him toward it. There is an acute internal struggle the outcome of which determines whether he learns to swim or stays on the bank. And this in turn determines years hence whether in a boating accident he acts the part of a hero and saves his companion or himself miserably perishes.

The causal sequence is woven through

this whole complex pattern of events without a break. There can be no doubt of this. But a significant factor in this sequence is the internal, that is, the mental, reaction of the child who stands trembling on the river's brink in an agony of indecision, torn by conflicting fears of death in the water and of the jibes of his playmates. The normal healthy boy usually rises to the situation in manful fashion. He weighs over against the unknown terrors of the water, with at least a sporting chance of successful achievement, the certainty of unremitting torments of ridicule, and he takes the plunge. It is a real choice. He must do one thing or the other. And his full awareness of the future consequences of the choice is the decisive factor with him.

This choice is determined by hereditary endowments, environmental influences, and previous choices, which have resulted in the gradual formation of mental attitudes and what we call character. And the choice is a determining agent with reference to subsequent acts and the further development of character. The timid boy expresses the "inner nature" of his character and temperament when he chooses to step from the bank into deep water with

assumed *sang froid*. The prevision of consequences, the impulsive drive, and the emotional thrills, the wavering doubt, the mind "made up," and the will to achieve success or perish—these internal processes are as truly factors in the resolution of the problem of conduct as are the depth and swiftness of the water and the boy's inherited bodily organization.

And the fact that the boy believes that he is free to enter the water or stay out is not a negligible illusion which can be invoked only by resort to a trick of dialectics. It is a real causative factor. If the river is deeply frozen he knows that he is not free to swim in it and the choice does not arise. So also if his muscles have been hopelessly crippled by infantile paralysis or his mind kept flabby and his boyish ideals aborted by injudicious coddling. The mollycoddle, like the physical cripple, is not free to swim; he knows it; and the choice is never really presented to him. Kant's dictum, "You can because you ought," must be reversed: "You ought because you can," if the moral issue is to be admitted here at all.

Our feeling of freedom is one of our greatest satisfactions. This feeling arises naturally during the free expression of our

vital functions, by reason of conscious participation in the performance of those functions. Most of us do not analyze this feeling of freedom but we enjoy its exercise. And the belief in freedom, as we have seen, is at times a real causative factor in determining a course of action. If one attempts to find a rational justification for this belief, his judgment may be true or faulty. The causal efficiency of the belief remains in either case as long as the feeling of freedom endures.

If now one should become convinced that his former belief in freedom is not well founded, that for instance the mystical freedom that he supposed he possessed is fictitious, then he may decide that there is no such thing as freedom, and thereafter his conduct may be radically different from what it was before. Self-culture, personal and social ideals have lost their controlling power as determining motives of conduct. But the more elementary instincts and impulses of self-preservation and selfish gratification persist, released from the inhibitions of higher control. The personality deteriorates. We have too often seen this tragedy enacted.

But there is a true human freedom that embraces the finest and the best that we

have in our natures. This natural freedom has no mystical powers, but its recognition is a tremendously effective human motive. We have only to rationalize our naïve feeling of freedom to see its value and to cherish it as one of the priceless birthrights of our common humanity.

The freedom of which we speak grows up within the life of the individual, is strengthened by exercise, atrophied by disuse, destroyed by disease, and propagated by precept and example. Its facies changes from day to day. In the development of vigorous, sturdy, aggressive character it thrives and plays a mighty rôle in the march of individual and social evolution. As each day's choices are made, its battles fought and won, the will to strive and to achieve takes on new and lustier strength. In this progressive movement the particular choice which is the battleground of freedom to-day is left in the rear to-morrow. Habit enters, and freedom of conscious choice is replaced by more elementary forms of behavior. This process is irreversible, and what I am free to choose to-day I may do as an unconscious automatism to-morrow.

The mechanism of this conscious freedom is very different indeed from those of

the free movements of inorganic and simpler living bodies. Its biological and social significance is different. Its personal significance is different. Let us examine the last point.

The conscious personality not only takes intellectual cognizance of certain of the events which are going on in his world; he also has satisfactions and dissatisfactions related with this knowledge. And here we may find a key which will open the door looking into the wider vistas of human personal freedom.

In riding in an airplane one does not need to control the machine in order to enjoy the view and the exhilaration of motion. The passenger has certain satisfactions of which we may assume the machine itself to be incapable. The pilot has still other satisfactions denied to the passenger. Each of the three exhibits natural freedom.

Now every normal, healthy man guides his life as the pilot guides his plane. Each must play according to the rules of the game or he crashes in disaster. Each lays out a course to follow and hopes to arrive at a chosen destination. The pilot's daily flight is only a part of his living as a human being. He has larger plans for his

future, for his personal advancement, his social obligations and privileges, for the ripening and stabilizing of his character. And he knows that the attainment of these ideals depends largely upon his own efforts. This is not theory. It is based upon the sum of human experience. He has satisfaction in these attainments.

These satisfactions, too, are natural functions of our bodies. And they are the functions that make the life of a self-conscious personality worth while to him. While he is consciously participating in the orderly processes which constitute his life he experiences a joy of living, of striving and succeeding. And even beyond this he has satisfaction in his unrealized hopes, his ideals and idealizations.

All living is a creative process in that old materials are fabricated in new patterns, and in organic evolution some of these patterns are preserved and from them ever new designs are constructed. Progressive organic evolution, that is, the unfolding and elaboration of the inner nature of the living substance in lawful patterns, is a natural causal sequence. It is creative. New organic patterns appear at every turn of the evolutionary process. These new patterns are designed and fab-

ricated by orderly intrinsic forces reacting to a particular system of environing energies. The process in its entirety is an expression of natural freedom.

Now, in human evolution and in the personal development of every human individual similar natural causal sequences are manifest, though the patterns of the performance are more varied, more colorful and of vastly greater significance in determining subsequent events. The fact that in the case of the man there is some awareness of what is going on is by no means a negligible epiphenomenon; for as we have seen, this awareness itself is a causative factor in the process. We act in view of possible future contingencies; that is, possible results of future action become causative factors in determining present action.

This, too, is a creative process. New standards of attainment are consciously fabricated, new personal and social ideals are formulated, and present conduct is shaped with reference to these ideals. The contrast between this sort of creative evolution and that of the lower organic ranks is the contrast between man and brute.

All of our movements are orderly as a part of the total cosmic pattern of our nat-

ural sequence. We see something of this pattern and we take delight in it. We know that we are part of the flowing pattern and we enjoy our rôles, however humble. It is good to be alive, and the broader the life the deeper the satisfactions of life. As we look backward and forward and see how our lives have been shaped by events of which we ourselves were part and how our present acts and desires and hopes may share in weaving vital patterns yet to be, the finest human satisfactions come to expression. This is our freedom. It is freedom to live and grow, to know that we do it and to enjoy this knowledge, to forecast the probable or possible future course of life and of personal development, and consciously to participate in the control of the future development. This natural freedom is real and in it we take satisfaction.

The fact that we can see some of the patterns of the progress of natural events and enjoy the process of intelligently adapting our living with reference to them makes us conscious partners in the drama of creation and not merely tiny cogs or wheels or pinions automatically and unconsciously playing a minor rôle in the cosmic mechanism. Indeed the eye of faith can

see the substance of things hoped for and make this substance a reality as a motive of present conduct and character building.

We have eaten of the tree of knowledge and natural freedom on the human plane literally makes us as gods, knowing good and evil, enjoying the good, fearing the evil, consciously shaping conduct and character and so creating new ideals of social and personal welfare. There is satisfaction in good achieved, in ideals approximated, in progress recognized, in hope entertained. These are all natural functions of our bodies. And the fact that we are free to perform these functions which are denied to the brutes, makes of human freedom to live, to grow and consciously to participate in shaping human life and evolution, a supernal achievement. This freedom carries with it the highest human satisfactions. It is worth the price that mankind at his best has always been willing to pay for his freedom.

But who am I who claim this real freedom? Is there still the suspicion that in this ostensibly scientific discussion the metaphysical ego of the schoolmen has slipped in by the back door while we were looking the other way? I think not. The "I" who makes decisions and exercises free

choice (as already defined) is first and last a protoplasmic organization. This organization has grown up by natural process and everything that it does is a natural event. To put it bluntly in the current jargon of science, I am *matter in motion*. True, it is a very complex and peculiar organization of matter, and its motions transcend our present powers of analysis. Again it is true that we do not yet know what matter is, nor what energy is, though practically we use and measure them. But the simplest, and indeed the only, way in which human life can be treated scientifically is to incorporate it in its entirety into the unitary causal sequence which in the aggregate comprises our world of experience. The person who experiences, who feels, thinks, chooses, and wills, is part of this same world of experience. At this moment he is the sum total of all the experiences that have come down from time immemorial to converge in his personality. And the personality will change and grow as long as its organization continues to experience. This is the ego which chooses and wills and by the exercise of these and other vital functions plays its part in creative evolution.

Right living, as we have seen, is an

orderly or lawful process. Chance is said to be a fickle goddess. The fact is, she is no divinity at all. She is an arrant faker who must be thrown out of our pantheon of nature. This has been made very clear by Dr. F. H. Hankins,¹ who shows in a well-reasoned paper that a world of pure chance would be a world of utter chaos, and further that only on the assumption of a determinism which is itself a determining is knowledge possible or any control of natural processes within our reach. He also disposes of the popular fallacy that radical determinism leads to fatalism. If human destiny is controlled by arbitrary caprice of the Fates (call them Chance, or what you will), the process is essentially lawless; but such philosophies or theologies are the opposite of determinism, which assumes the reign of law everywhere. And if it be recognized that human life and consciousness evolve within this same lawful realm, that the human mind (and of course the colligated bodily processes) is knit into the same natural causal sequence, that mind is not only a result, but also a true cause of natural events, that the foreknowledge of the con-

¹ Individual Freedom with some Sociological Implications of Determinism. *Jour. Philos.*, vol. xxii, 1925, p. 617.

sequences of present action is a causative factor in shaping this action, and that these powers are part of the apparatus of human control, then it follows that "such control is the only possible freedom and is removed by an infinity of human satisfactions from the fatalism into which man would be plunged by a genuine indeterminism." Again Dr. Hankins says, "Strict determinism alone makes possible a genuine freedom, because it alone makes possible self-expression and self-realization."

Our biological analysis of human nature has led us to the same conclusion. There is no escape, except by reaching out beyond experience into mysticism. And such an appeal to transcendentalism adds nothing of practical value to what we already have within our grasp. Common and scientific experience provide a natural frame within which feeling, thinking, willing, purpose, self-culture, moral sanctions, choice, freedom, faith, hope and charity find their places, all in orderly patterns of determined and determining cause-and-effect processes.

Woodbridge has remarked, "Human life is a moral event." It is equally true that human life—all of it—is a natural

event, and we do not need to leave the realm of natural causal sequences to recognize that it is also a moral event.

The naturalist, with his present limitations, may not be able to envisage the whole of living and experiencing. There is a great wealth of experience which cannot be fully explored by any of the methods of natural science now available. Science is content to see art, metaphysics and religion go their own ways with their own technical procedures, and the scientific man refreshes and enriches his own life with the priceless fruits of their labors. But it is a satisfaction to him to believe that these appreciations, aspirations and moral sanctions are after all natural expressions of his inner nature. I am living one life—physiologically, mentally, morally—whose component parts interact and reinforce one another. There are no air-tight compartments, in one of which I eat, in another I think, and in another I worship. The whole life as we mortals live it on this planet, is a natural process, though the methods of science are not as yet adequate to unmask all that we experience in some of its aspects.

In the preceding pages the attempt has been made to evaluate human freedom in

terms of the common meaning of the word in so far as this can be done within the limits set by the methods of natural science. This naturalistic treatment requires that the concept of uncaused action and all metaphysical categories, absolutes and sanctions be rigorously excluded. Such limited freedom will not be acceptable to those who demand the divine privilege of creating something out of nothing or of choosing to which of the laws of nature they will conform their actions. The people who make claim to these powers have difficulty in making good in practice. But natural freedom as here defined meets every practical need; and it embraces the noblest human capacities and satisfactions.

We can now cast aside those crudely fatalistic dogmas which deny to the man those powers which every brute possesses, powers to control in some measure his own behavior through forces which come to expression within his own internal organization. For when we recognize that human nature is different from that of brutes, that our powers of self-control and self-culture are vastly greater than theirs, we have before us the instrumentalities of a freedom that is enlarged in

corresponding measure. A denial of the reality and efficacy of my power to shape my own character in accordance with consciously fabricated ideals and so to exercise genuine freedom to enlarge, purify, and ennable my personality is a reversion to a primitive and tawdry fatalistic mythology of a barbarous age.

The natural fruits of such a primitive mythology are reversion to barbarism. If I delude myself with the pretense that I have no control of myself, my environment or my fellow-men, my personal problems are greatly simplified. The moral issue cannot be raised. This seems to satisfy some people. Not feeling accountable for their actions to themselves or any other power, they justify themselves in all sorts of indulgence and antisocial practices. And they condone such practices in others with resulting weakening of the machinery of social control all along the lines from family discipline to courts of law and legislative assemblies.

These vicious tendencies can be successfully combated in some quarters by moral and religious appeals. In some other circles these motives are less effective, apparently because they seem to be at variance with a defective philosophic or

scientific determinism which places the control of human destiny wholly outside the personality. The fallacy lies in failure to understand the actual organization of the human personality and to see it in its proper setting in the world's events.

Of all the fates that control my destiny the youngest sister is by far the most comely and the most significant. She is the imminent divinity of creative evolution in the human realm. I know her most intimately, for she is that face of my conscious personality that looks forward and points the way. She directs and controls my steps, sometimes in a pulse of heedless passion out into the dark and sometimes on a path brightly illumined by the lamp of rational judgment and foresight. I know her well, for she is myself in my moments of self-appraisement, of deliberate self-determination, of fabrication of purposeful motives and ideals, of creative impulses, of social and moral responsibility.

The conclusion of the whole matter can best be expressed in the words of an ancient scripture: "Ye shall know the truth and the truth shall make you free."

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